massDOT

Massachusetts Bay Transportation Authority

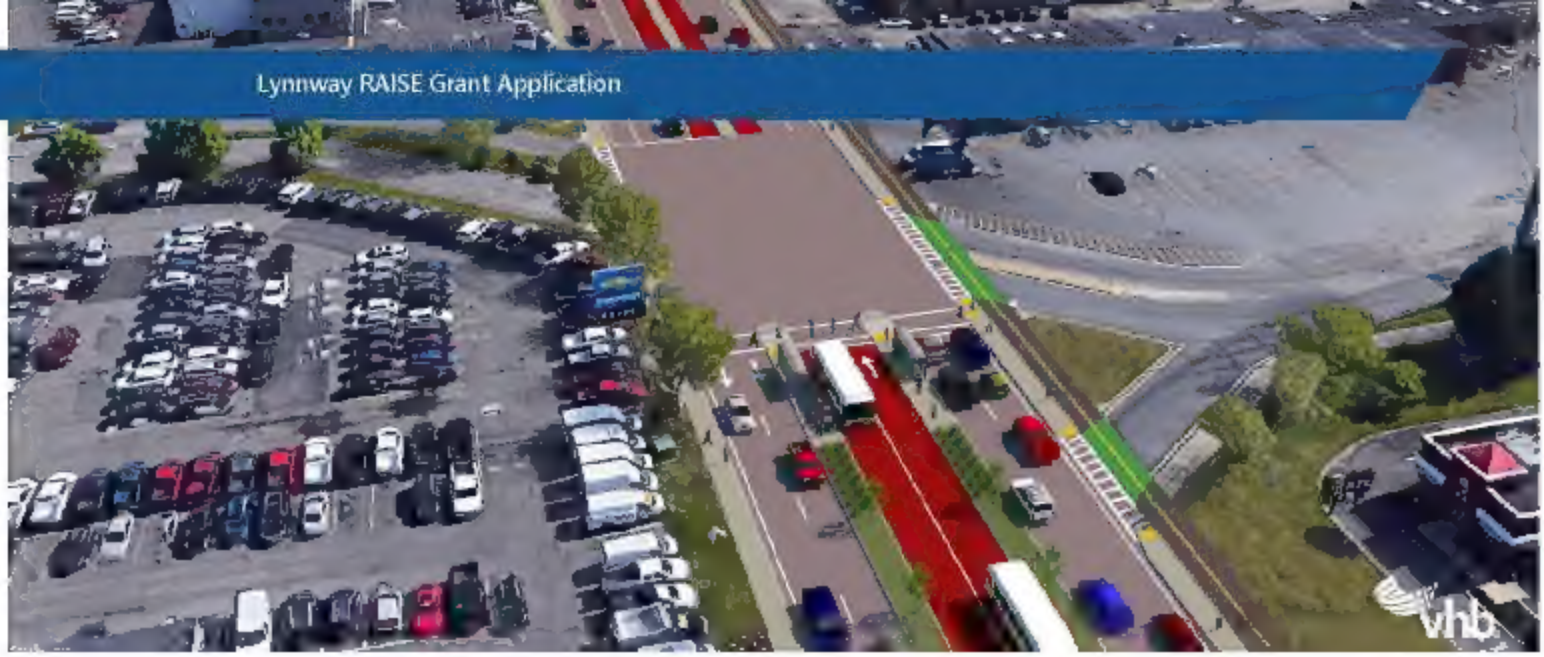
dcr Massachusetts

Equitable & Sustainable Multimodal Solutions for Route 1A:

Center-Running Bus Lanes, Pedestrian Safety, and Bicycle Connectivity along the Lynnway

US DEPARTMENT OF TRANSPORTATION | RAISE GRANT APPLICATION

JULY 2021



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GREEN TEA

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Project Description

The Massachusetts Department of Transportation (MassDOT), in partnership with the Massachusetts Bay Transportation Authority (MBTA) and the Massachusetts Department of Conservation and Recreation (DCR), is requesting support through the Rebuilding American Infrastructure with Sustainability and Equity (RAISE) discretionary grant program to reconstruct a section of Route 1A in Lynn with center-running bus lanes and a shared use path. The Project corridor stretches from Central Square–Lynn Station to the General Edwards Bridge along Market Street and the Lynnway (Route 1A). This Project is one part of a proposed transit corridor connecting the bus and commuter rail Central Square–Lynn Station in Lynn to the northern terminus of MBTA Blue Line rapid transit service, Wonderland Station in Revere.

Project Background

Route 1A provides a critical link from downtown Lynn through Revere to the MBTA Blue Line rapid transit at Wonderland Station. This corridor has been identified as needing multimodal upgrades in numerous recent planning studies which are detailed later in this document, including a Lynnway Master Plan Study currently underway. Today, many Lynn residents use the bus or drive to Wonderland Station to access jobs in Boston, including at Boston Logan International Airport. There are currently plans to convert underutilized industrial and commercial land into mixed-used developments including over 4,000 residential units along this corridor in Lynn, as well as plans for similar growth along the corridor in Revere. This level of proposed developments, which has been marketed to Boston commuters with its location on Route 1A and proximity to the commuter rail, will further increase the need for reliable bus service. Improving transit, walking, and biking options along this corridor congruent with this development will be critical to addressing today's congestion and mitigating future traffic impacts.

Currently, Route 1A in Lynn has three travel lanes in each direction with sidewalks on both sides (Figure 1-1). MBTA Bus Routes 439, 441 and 442 use Route 1A to connect through Lynn to Wonderland Station in Revere, and the MBTA serves approximately 7,600 bus passengers daily on the corridor from 6 AM to 8 PM. *Congestion in the Commonwealth: Report to the Governor 2019* listed Route 1A in Revere as one of the most consistently

congested corridors in Massachusetts. The buses traveling between Central Square–Lynn Station and Wonderland Station experience congestion throughout the corridor, with peak period delays of up to 15 minutes per trip on trips that take approximately 10 minutes in a free-flow condition. Up to eight buses per hour use the corridor during peak periods in each direction, with approximately 70 buses using the corridor in each direction on weekdays.

Figure 1-1 Existing Conditions—the Lynnway at Harding Street, Looking North

Local bus service is an important, affordable transit option for Lynn residents. Central Square–Lynn Station is located in Lynn's downtown area, which has a high rate of households with no cars and households with incomes below the poverty line—factors pointing to transit reliance. Many of Lynn's environmental justice communities are also located in and around the downtown. While Central Square–Lynn Station is a commuter rail and bus station, the one-way commuter rail cost to Boston is $7.00, compared to $2.40 or $4.10 (depending on payment method) when taking a bus to Wonderland Station and riding the Blue Line rapid transit into Boston. For financial reasons, many commuters choose to commute via the bus and Blue Line.

In addition to bus delay and congestion, Route 1A also faces a lack of safe, accessible pedestrian and bicycle infrastructure. The Lynnway itself serves as a barrier between downtown Lynn and the waterfront as the current cross section presents a challenge for pedestrians and bicyclists trying to cross. The sidewalks along large portions of this corridor do not meet Americans with Disabilities Act (ADA) standards, crosswalks are long and uncomfortable across high-speed traffic, and no bicycle facilities are provided. Many intersections don't have crosswalks, with long distances between crosswalks that do exist.

Project Benefits

The Project includes center-running bus lanes with transit signal priority, a shared use path along the eastern edge of the Lynnway, improved bus stops, and improved pedestrian crossings as part of an important transit corridor along Route 1A connecting the Central Square–Lynn commuter rail station in Lynn to the Wonderland rapid transit station in Revere (Figure 1-2).

Figure 1-2 Rendering of Proposed Multimodal Improvements on the Lynnway at Harding Street, Looking North

Benefits

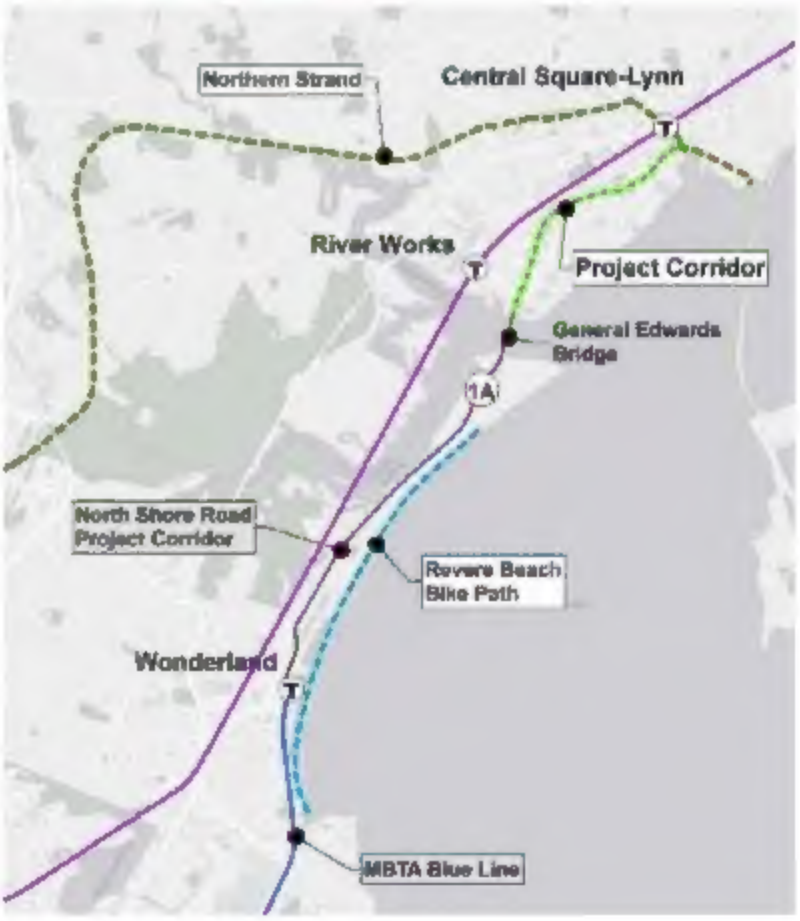
- Improves bus speed (up to 6 minutes per trip) and reliability
- Allows MBTA to provide more bus trips with the same number of vehicles by reducing travel time and improving reliability (reducing variability).
- Creates a fast, frequent, flexible connection to the Blue Line
- Provides ADA-accessible pedestrian refuges with new stops on Lynnway
- Provides a separated path for bicyclists and pedestrians
- Adds green space along Lynnway
- Allows travel for school buses and emergency response vehicles
- Upgrades bus stops for ADA compliance
- New safety and comfort amenities, such as bus shelters, at all bus boarding platforms

The center-running bus lanes will eliminate conflicts between buses and right-turning vehicles, provide pedestrians with signalized crossings and refuges while crossing the wide roadway, and help to slow traffic. The bus lanes would replace roadway space currently dedicated to general purpose traffic, reducing the Lynnway to two general purpose lanes in each direction with allowances for turning lanes at appropriate intersections. Bus stops would be provided at intersections with ADA-compliant platforms providing all pedestrians with at least one refuge to facilitate crossings. To ensure proper lane widths, the Project would make adjustments to curbs throughout the corridor and modifications to the median where there is no landscaping, with the ability to increase greenspace as well as provide bus amenities such as shelters and benches.

Transit signal priority will prioritize buses on the corridor by extending green phases to allow oncoming buses to pass through intersections or by reducing red phases for buses waiting at intersections, improving bus speed and reliability. The combination of the dedicated bus lanes with the transit signal priority will allow the MBTA to provide more bus trips with the same number of vehicles by reducing travel time and variability. This would create a fast, frequent, flexible connection between downtown Lynn and the Blue Line. Additionally, the bus lanes with transit signal priority could accommodate school buses and emergency response vehicles, allowing them to bypass vehicular congestion, improving emergency response times and school transportation.

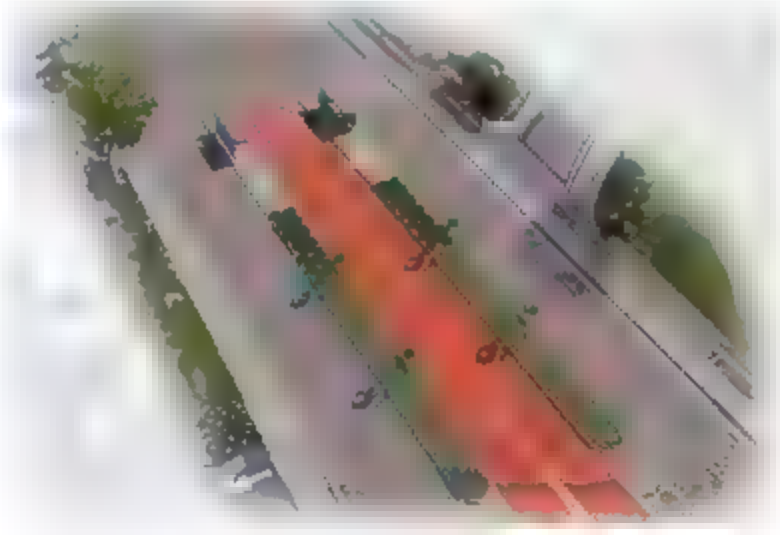
The shared use path along the eastern side of the roadway will provide increased separation and safety for bicyclists and pedestrians. The path will have eventual bicycle and pedestrian connections to the Revere Beach Boulevard boardwalk in Revere to the south and the Northern Strand Community Trail to the north. The Northern Strand Community Trail will stretch from Everett to the Lynn Waterfront via Malden, Revere, and Saugus. The shared use path will provide a critical link in the bicycle network that will eventually extend to Wonderland Station (Figure 1-3).

Figure 1-3 Bicycle Network



In addition, this Project will overcome a major barrier in the pedestrian network by providing shortened, ADA-compliant crossings (Figure 1-4). With pedestrian refuge islands in the middle of the roadway, non-motorists will only have to cross 2-3 lanes of one-direction traffic at a time instead of 6-7 lanes of bi-directional traffic.

Figure 1-4 Rendering of Typical Bus Stop and Crossing on the Lynnway



Project Goals

The Project's goals directly align with RAISE merit criteria:

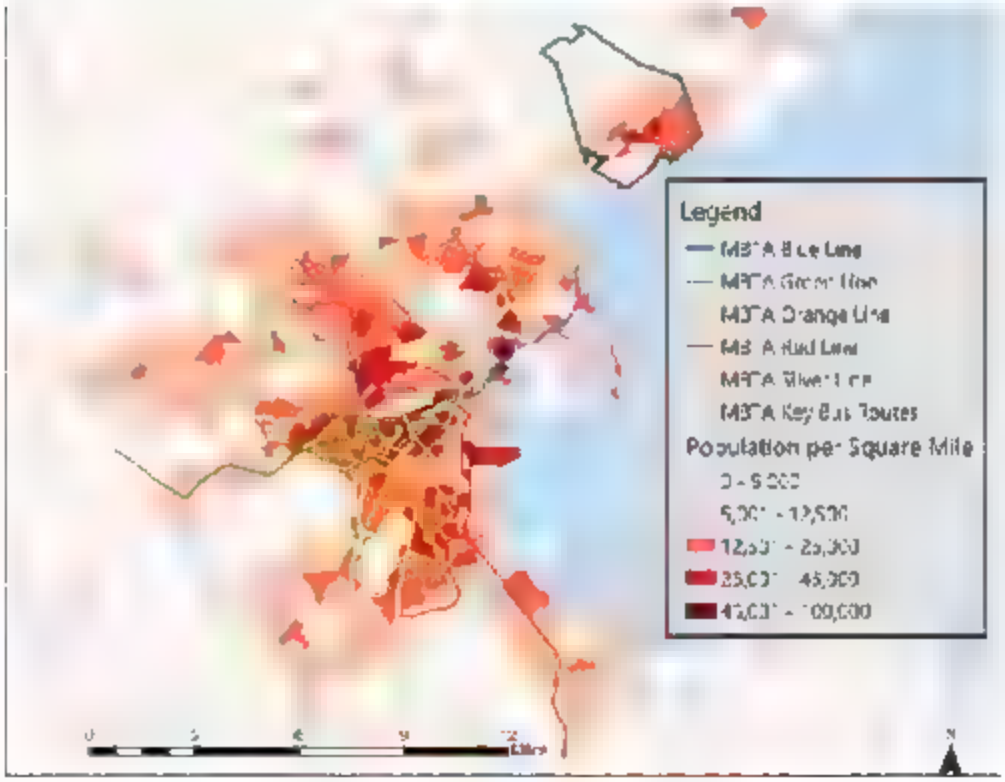
- **Provide equitable, innovative high-quality transit** by providing center-running bus lanes along Route 1A between Central Square–Lynn Station and the General Edwards Bridge. These bus lanes would eventually be continued in Revere to Wonderland Station, which is the northern terminus of the Blue Line rapid transit. The Lynn downtown area is made up of environmental justice communities and Areas of Persistent Poverty that will gain a more affordable and reliable transit option with the fast, frequent, flexible connection to the Blue Line provided by the proposed bus lanes.
- **Provide safe multimodal infrastructure** with the creation of a shared use path in addition to the center-running bus lanes. The shared use path will provide a safe bicycling and walking option for work, shopping, and recreational trips. The shared use path will connect to the Northern Strand Community Trail, which will stretch from Everett to the Lynn Waterfront. In addition, crossings across the Lynnway will be shortened with pedestrian refuge islands next to the bus lanes. All crossings and bus stops will be ADA-compliant.
- **Provide better access between Boston and the North Shore.** Route 1A provides an important connection between Boston and the communities located to the north, referred to as the North Shore. However, *Congestion in the Commonwealth: Report to the Governor 2019* listed Route 1A in Revere (just south of Lynn) as one of the most consistently congested corridors in Massachusetts. The Lynnway bus lanes are a key part of that overall corridor. Over 12,000 trips per day on weekdays and over 8,000 trips per day on weekends are made from Lynn to Boston. This Project aims to provide safe, reliable alternative transportation options along Route 1A from Central Square–Lynn Station to the General Edwards Bridge with better bus, bicycle, and pedestrian infrastructure. The Project will improve transit and active transportation for both current system patrons as well as future customers who will shift from automobile travel, resulting in a reduction of vehicle miles traveled (VMT) and the associated positive influence on environmental and climate factors from VMT reduction.

2

Project Location

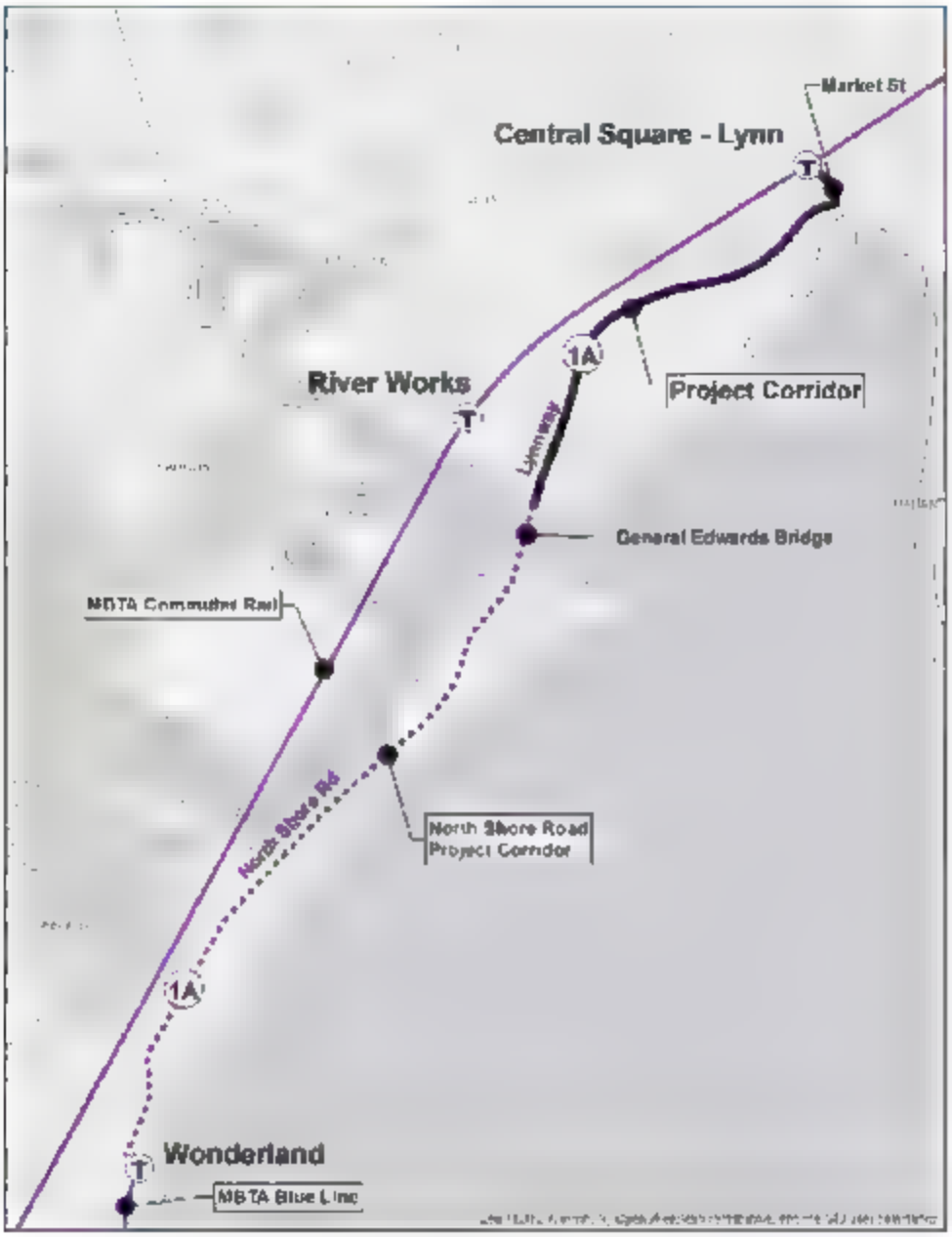
Lynn is a unique community in the Greater Boston region and a part of the Census-designated Boston, MA--NH--RI urbanized area. Located 10 miles northeast of Boston, the densely populated city of nearly 95,000 residents is more similar to Boston's more immediate neighboring communities, yet it does not have direct connections to MBTA rapid transit or key bus routes as it is outside the core MBTA service area (Figure 2-1).

Figure 2-1 Lynn in the Greater Boston Region



The Project corridor is located on Route 1A on portions of Market Street and the Lynnway, stretching from Central Square–Lynn Station to the General Edwards Bridge (Figure 2-2).

Figure 2-2 Project Corridor



The Project corridor's northern terminus is located in downtown Lynn, serving a large residential area, while the rest of the corridor runs along commercial and industrial areas (Figure 2-3).

Figure 2-3 Project Area

Project Roadways

As stated previously, the Project includes portions of Market Street and the Lynnway between Central Square–Lynn Station and the General Edwards Bridge.

Route 1A connects Boston to the North Shore, including Lynn, and beyond. It is a major commuting route and experiences severe congestion. The roadway has a lack of acceptable pedestrian and bicycle infrastructure for much of its length, affecting safety, access, and comfort. Bus services using Route 1A are disrupted by deficiencies, from slow transit travel times to unacceptable bus stop infrastructure. Wonderland Station, the northernmost Blue Line rapid transit connection to Boston, is located adjacent to the roadway in Revere, where it is known as North Shore Road.

The Lynnway is an urban principal arterial under jurisdiction of the Department of Conservation and Recreation (DCR). The Lynnway is part of Route 1A from the Revere city line to the Nahant Rotary where it becomes Lynn Shore Drive. The Lynnway has three through lanes per direction. Adjacent land use is currently mostly commercial and industrial with significant mixed-use redevelopment under construction and planned in the future.

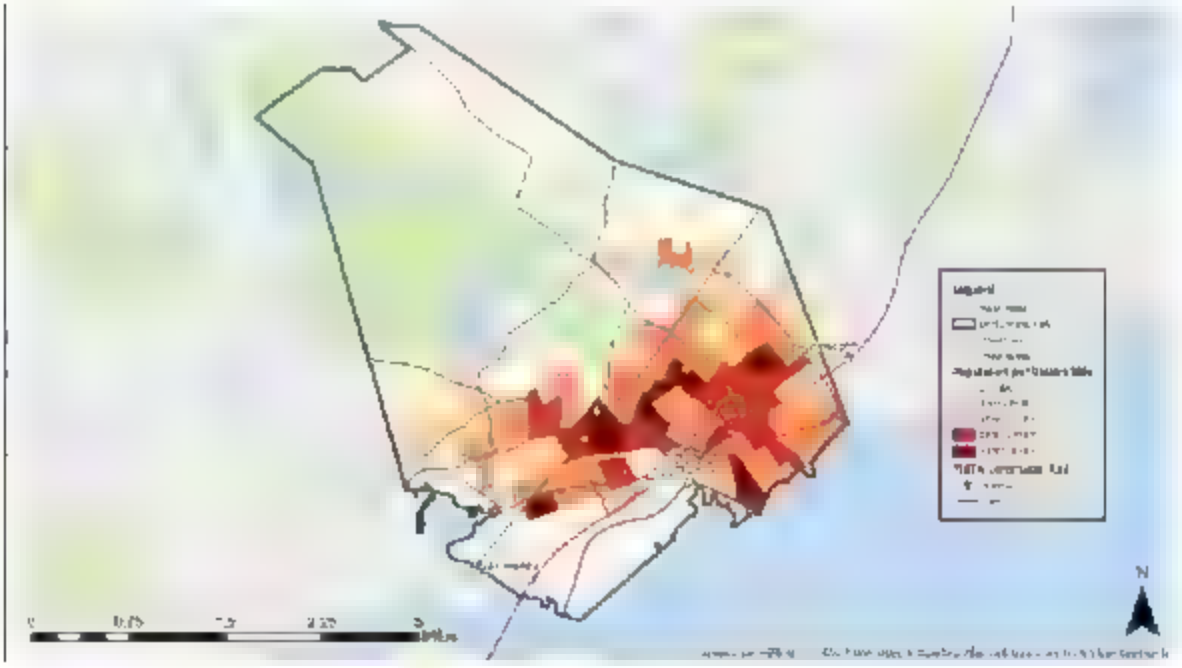
Market Street is an urban minor arterial. Market Street connects North and South Common Street to the Lynnway. The Central Square–Lynn Station commuter rail and bus stops, and associated parking garage is located on Union Street just off Market Street and Broad Street. In the Project area between the Central Square–Lynn Station busway and the Lynnway, Market Street has two through lanes in each direction. Land use along the roadway is generally commercial, although between the Lynnway and Broad Street it is bordered by green space and North Shore Community College.

Community

Lynn is legislatively defined as a gateway municipality under Massachusetts Law[1]. A Gateway City is defined as a "a municipality with a population greater than 35,000 and less than 250,000 with a median household income below the Commonwealth's average and a rate of educational attainment of a bachelor's degree or above that is below the Commonwealth's average."

The majority of land area in Lynn is residential. Multi-family housing—which provides a good base for transit demand—is primarily located in and around the downtown area, particularly along Western Avenue (Route 107), North and South Common Street, and in the area east of Central Square–Lynn Station. These areas have the highest population densities in Lynn (Figure 2-4).

Figure 2-4 Population Density of Lynn



1 Commonwealth of Massachusetts General Laws, Part I, Title II, Chapter 23A, Section 3A.

Figure 2-5 Environmental Justice Population of Lynn

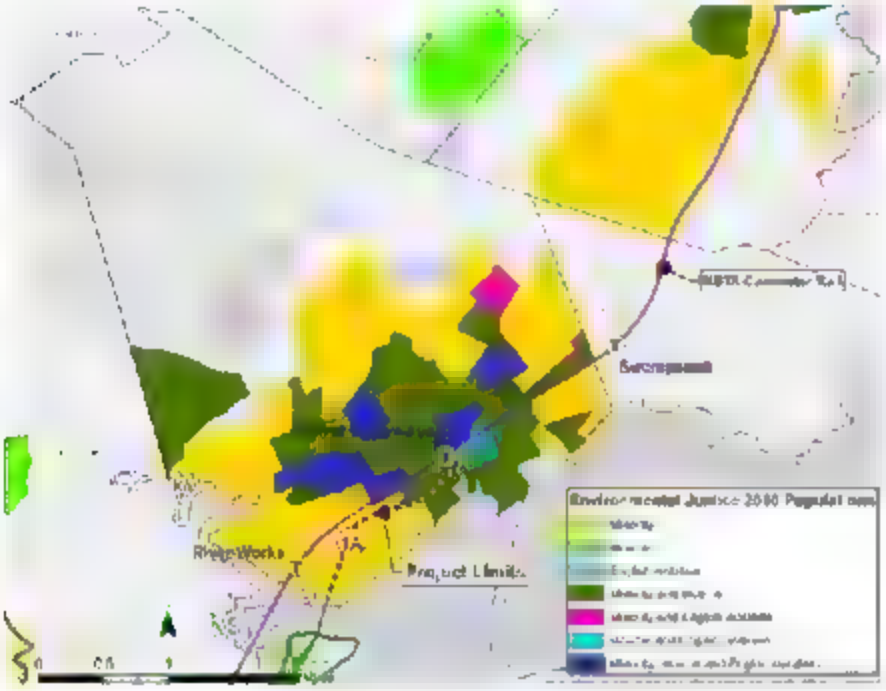
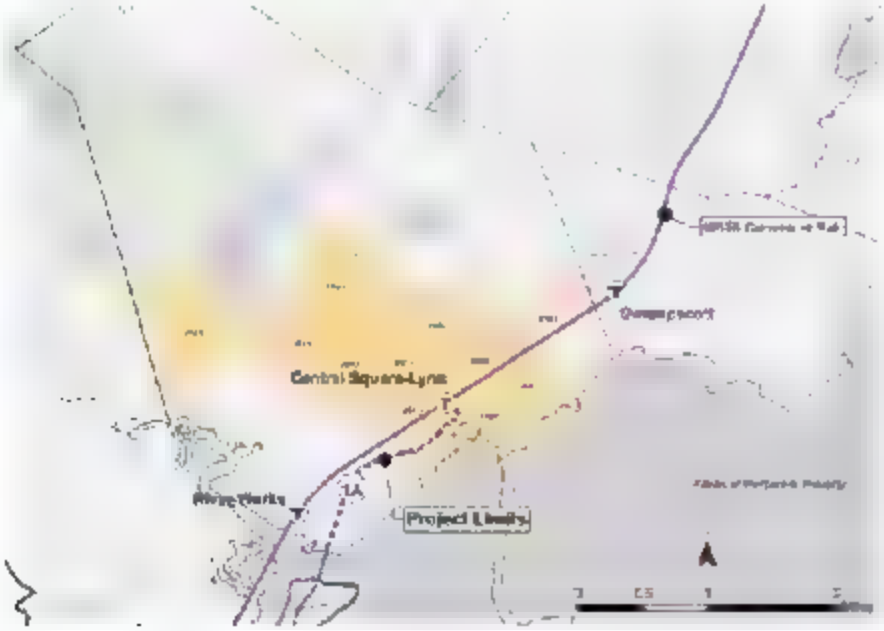


Figure 2-6 Areas of Persistent Poverty in Lynn



Many of Lynn's environmental justice populations—minority, English isolated, or low-income populations—are located in and around the downtown. The Project is directly adjacent to minority and low-income populations, and all three categories of environmental justice populations are located in and around the downtown and are served by the Project (Figure 2-5).

In addition, eleven census tracts in Lynn qualify as Areas of Persistent Poverty (APPs) according to the RAISE Persistent Poverty Project Status Tool[2] (Figure 2-6). Ten APPs are located within one mile of the Project (2055, 2059, 2060, 2061, 2062, 2065, 2067, 2068, 2069, and 2070), two of which are directly adjacent to the Project (2069 and 2070). The census tracts meet the criteria of having "a poverty rate of at least 20 percent as measured by the 2014–2018 5-year data series available from the American Community Survey of the Bureau of the Census."[3]

The downtown area also has Lynn's highest rates of zero-car households (Figure 2-7). With lower incomes and a reduced access to personal vehicles, people in this area are more likely to rely on transit, cycling, and walking for access

2 https://datahub.transportation.gov/stories/s/tsyd-k6ij
3 https://datahub.transportation.gov/stories/s/tsyd-k6ij

Figure 2-7 Zero-Vehicle Households in Lynn

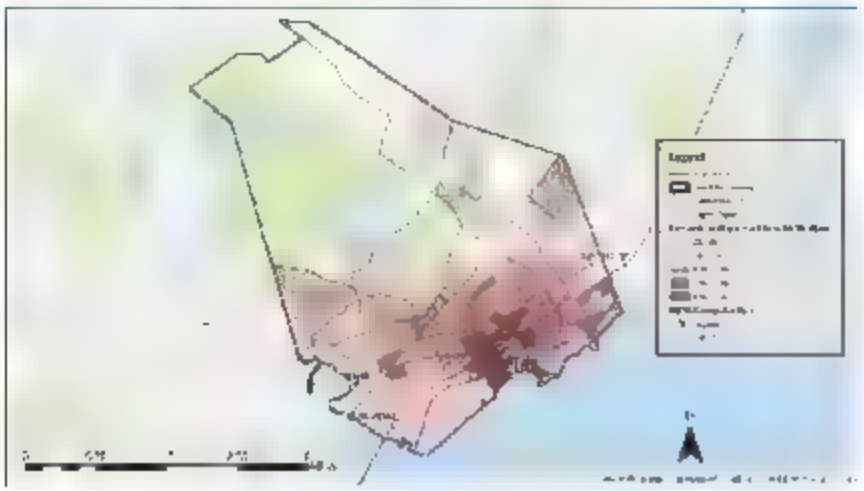
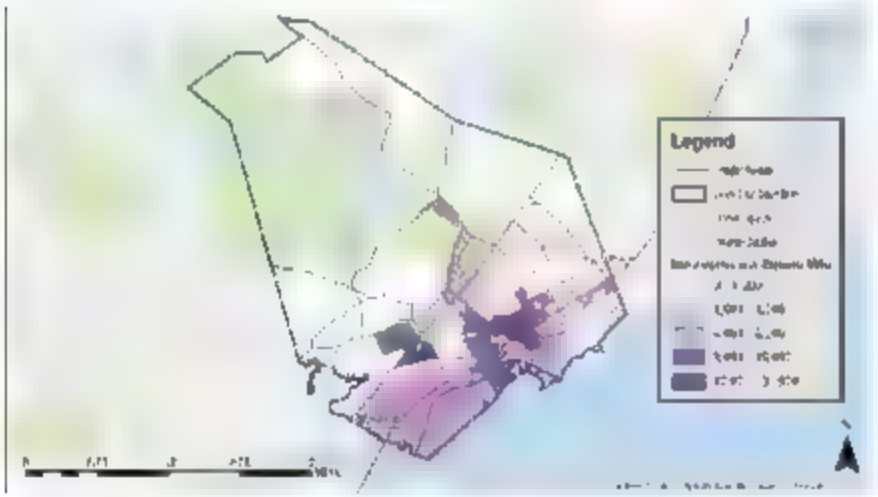


Figure 2-8 Employment Density in Lynn



to employment, health care, schooling, and recreation, or trips are not made, which has other negative impacts. Solutions to provide equitable transportation for this area must involve a multimodal approach, including transit and active transportation, to provide mobility solutions that will promote a healthy, sustainable future for residents.

Employment centers (Figure 2-8) and commercial activity (Figure 2-9) are clustered near the downtown, as well as along the Lynnway. Greater concentrations of employment and retail can make it easier to develop transit services, as the service can connect people to distinct centers, rather than dispersed locations. The density and mix of uses in the downtown and along the Lynnway can build sustained demand for transit throughout the day.

While land use is currently predominantly commercial and industrial along the Lynnway, future developments plan to transform the areas along the Lynn Harbor and Saugus River into residential and mixed-use developments. A full build-out could establish over 4,000 new residential units, over 1.5 million square feet of retail and commercial uses, and a new green space along the Lynn Harbor to create a vibrant new connection to the waterfront (Figure 2-10). The City of Lynn recently released multiple planning documents, including the *Revised Waterfront Master Plan*, that emphasize the economic development potential of the land between downtown and the waterfront and the importance of the Lynnway as the backbone to supporting that growth. Each of the documents detail the need for modifying the roadway to better serve the needs of the community today and in the future.

Figure 2-9 Land Use in Lynn

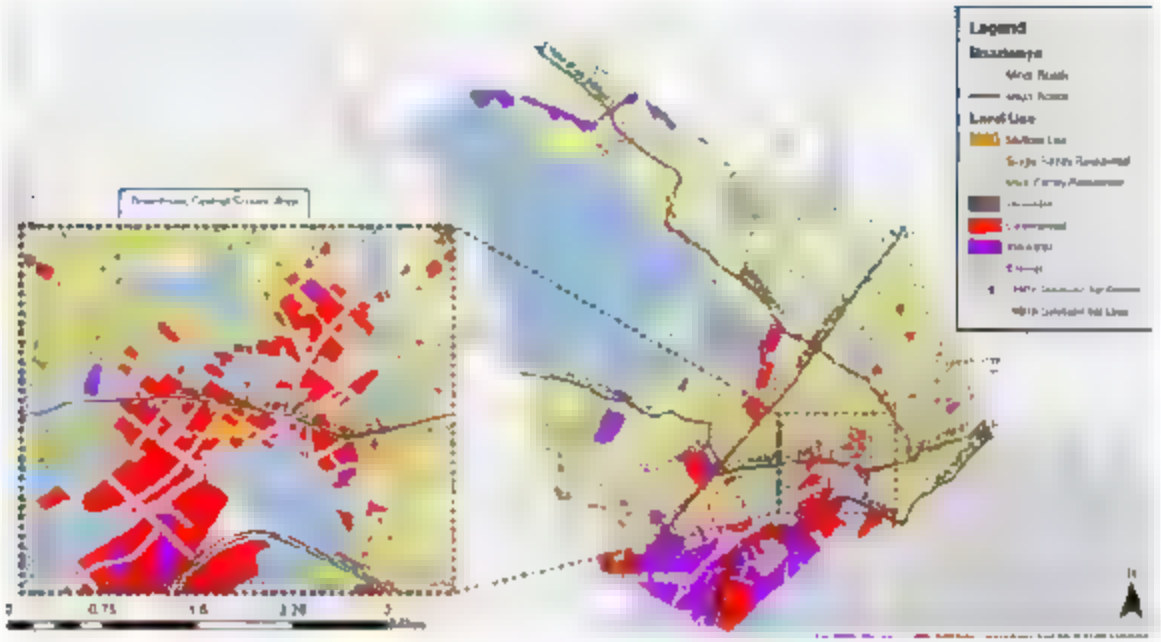
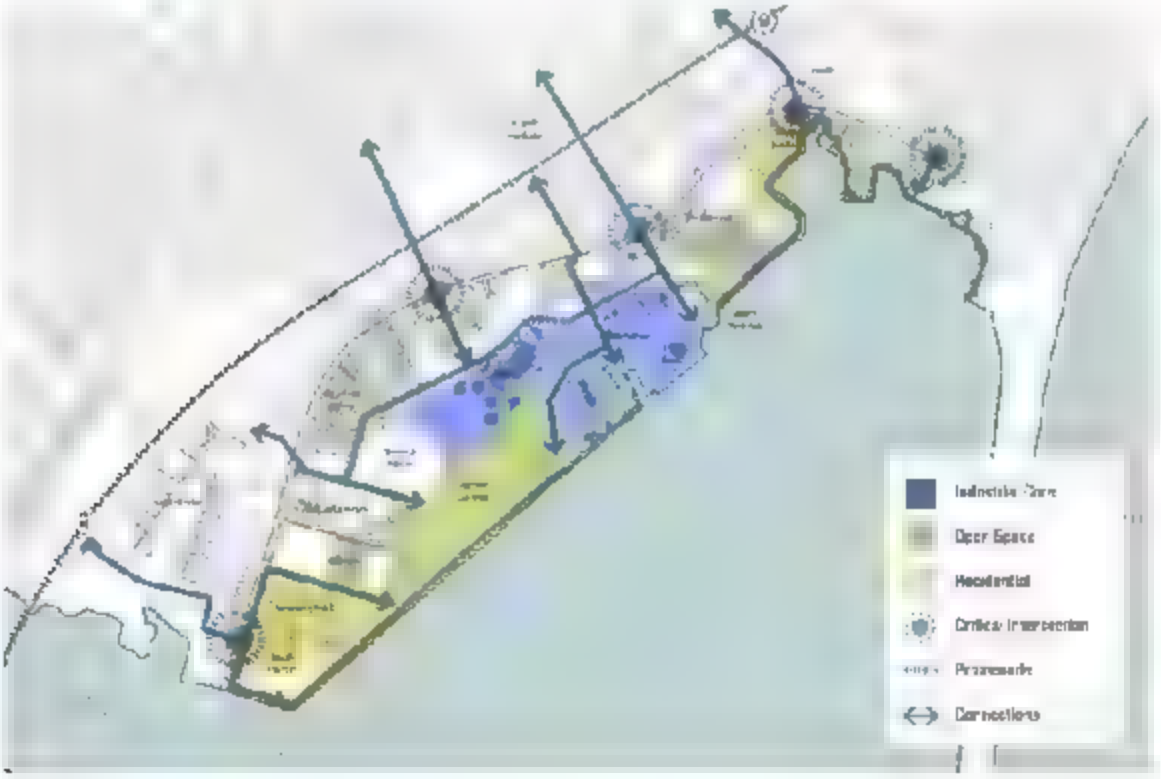


Figure 2-10 Planned Land Uses and Connectivity along Lynn Waterfront
Lynn Revised Waterfront Master Plan, September 2019



Existing Transportation

The MBTA network serves residents of Lynn through several means (Figure 2-11). Twelve MBTA bus routes connect Lynn to other communities in the region and downtown Boston[4]. A number of these bus routes connect to Wonderland Station, where passengers can access the MBTA's Blue Line rapid transit service, three of which travel along Route 1A to connect Central Square–Lynn Station to Wonderland Station. These buses travel through a congested corridor, resulting in delays that increase travel time and reduce reliability. The MBTA Commuter Rail Newburyport/Rockport Line has a station in Lynn, providing connections to other North Shore communities and downtown Boston. The commuter rail line provides a faster trip than other transit modes, but at a higher cost—the typical $7.00 one-way commuter rail fare between Lynn and Boston compared to $2.40–$4.25 for bus or Blue Line service results in many Lynn residents choosing to use other modes. Lynn's population density, urban development pattern, proximity to Boston, and high levels of transit dependency call for more affordable and reliable transit service to and from Boston.

Figure 2-11 Overview of Lynn Transit Services

Commuting Trends

Outside of Lynn, Boston is the largest trip destination by municipality for trips beginning in Lynn, accounting for over 12,000 trips per day on weekdays and over 8,000 trips per day on weekends, and the Route 1A corridor is the most direct path for area residents to access Boston. Approximately 1,500 of these trips occur on commuter rail, Express Bus, or via the Blue Line. Of the commutes to work or school, Boston accounts for over 4,000 trips per weekday. Travel patterns between Lynn and Boston are similar on weekdays and weekends, which might indicate that a considerable proportion of Lynn residents work outside regular business hours, as commonly seen in the service, retail, and healthcare industries.

MBTA bus and Blue Line offer longer spans of service, especially on the weekends. While the bus, Blue Line, and commuter rail begin offering service at similar times throughout the week, the bus and Blue Line service continue after midnight while the commuter rail ends service by 11:30 PM on weekdays and by 10:00 PM on weekends. Also, the bus and Blue Line offer more frequent headways than the commuter rail throughout the day, making the bus and Blue Line more convenient for accessing work outside of regular business hours.

Bus Service

Central Square–Lynn Station connects to nine MBTA bus routes (Figure 2-12). Several routes provide a connection to Boston (via the Blue Line or express service to Haymarket,

4 Currently, only ten MBTA bus routes serve Lynn as service for MBTA Bus Routes 434 and 456 is suspended.

which provides connections to the Green and Orange Lines). In addition, the routes provide service to key North Shore employment and shopping centers in Salem, Marblehead, Peabody, Saugus, Chelsea, and Revere, including the forthcoming Suffolk Downs development. These are the most important destinations after Lynn and Boston. A number of these routes also provide service to the schools in Lynn and according to the Director of Transportation of the Lynn Public Schools, MBTA bus service is a critical transportation mode that not only gets children to and from school, but also to employment, health care, and recreation after school.

Bus fares vary by destination—the local fare is $1.70, while routes to Boston charge the inner express fare of $4.25, and those transferring to the Blue Line must pay the subway fare of $2.40. This project will improve travel times for those paying the lowest fares.

Figure 2-12 MBTA System Map

MBTA Bus Routes 426W, 439, 441, and 442 provide a connection to Wonderland Station. MBTA Bus Routes 439, 441, and 442 travel via Route 1A, while MBTA Bus Route 426W travels through Saugus. MBTA Bus Route 426 provides express service to Haymarket Station in downtown Boston.

Route 1A Bus Service

The bus routes along Route 1A were examined in more detail as part of the Better Bus Project. The bus profiles exhibited that they were unreliable routes, often due to travel time delays. Based on the findings, the MBTA made a significant investment to improve Route 1A bus service and this project would produce further gains on that investment. The MBTA defines a reliable bus as one that does not depart from the origin stop early or more than 3 minutes late, departs from mid-route stops between one minute early and six minutes late, and arrives at the final stop no more than five minutes late. The following paragraphs summarize reliability, ridership, and delay trends reported in the Better Bus Project Route Profiles as well as typical headways from current bus schedules.[5,6]

MBTA Bus Route 439 is the only route serving the Town of Nahant. It mainly functions as a connection between Nahant and Central Square–Lynn Station, but also serves Wonderland Station, providing Nahant residents a connection to the rapid transit network. As it is a commuter route, service is restricted to weekdays with five trips per day in each direction.

5 https://www.mbta.com/projects/better-bus-project/update/bus-route-profiles-now-available
6 https://www.mbta.com/schedules/bus

Overall reliability is very low at 61 percent.[7] Delays greatly increase the travel time for inbound trips in the evening peak hour.

MBTA Bus Routes 441 and 442 are very similar, as they both travel between Marblehead and Wonderland Station. The routes operate seven days a week and have the same route alignments through Lynn and Revere, traveling on Route 1A. Combined, Routes 441 and 442 buses are scheduled to arrive at Central Square–Lynn Station 3-15 minutes apart in the morning peak period and 5-24 minutes apart in the evening peak period. The majority of passengers travel between Central Square–Lynn Station and Wonderland Station.[8] Routes 441 and 442 have 65 percent and 68 percent overall reliability respectively on the weekdays, with 0.3 percent of trips dropped.[9] This poor performance is partially caused by the actual travel times exceeding scheduled travel times, especially on Route 442 Outbound.

Accessibility

The Lynnway has sidewalks on both sides of the roadway, but the condition of these sidewalks is potentially not adequate to serve all users requiring access to a bus stop. The MBTA only considers three of the fifteen bus stops along the Lynnway accessible and compliant with ADA standards. This means that even though sidewalks may be present, the sidewalks may not be wide enough to accommodate a bus's accessibility ramp or may not be accessible via a nearby curb ramp.

Ridership and Usage

The ridership of bus routes serving Central Square–Lynn Station are summarized in Table 2-1. Around 350 people connect through to the Blue Line on an average weekday.[10] Middle and high school students are key audiences for the local bus services, using them throughout the day to travel to and from school, home, and work. Older adults are another key audience who use the services all day.

Table 2-1 Central Square–Lynn Station Bus Routes, Weekday Ridership (Fall 2019)

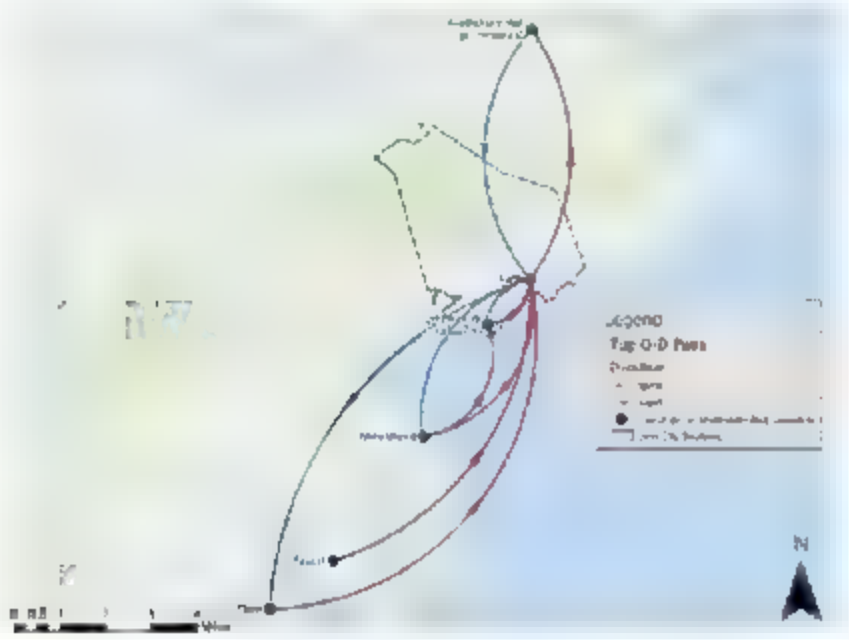
Route(s)	Description	Ridership
Travel Along Route 1A		
439	Nahant–Wonderland Station	96
441	Marblehead–Wonderland Station via Paradise Rd.	1,249
442	Marblehead–Wonderland Station via Humphrey St.	2,601
Travel Along Other Roadways		
426/W	Central Square Station, Lynn–Wonderland Station or Haymarket	1,647
429	Northgate Shopping Center–Central Square Station, Lynn	1,381
435	Liberty Tree Mall–Central Sq., Lynn via Peabody Sq.	627
436	Liberty Tree Mall–Central Sq., Lynn via Goodwins Cir.	707
455	Salem Depot–Wonderland Station	3,413
456*	Salem Depot–Central Square Station, Lynn	225

*MBTA Bus Route 456 service is currently suspended due to low ridership.

7 https://cdn.mbta.com/sites/default/files/projects/bettelbus/route-profiles/439.pdf
8 https://cdn.mbta.com/sites/default/files/projects/bettelbus/route-profiles/441-442.pdf
9 https://cdn.mbta.com/sites/default/files/projects/bettelbus/route-profiles/441-442.pdf
10 Based on Fall 2018 MBTA Ridership Data (before Better Bus service changes)

Ridership patterns were analyzed using the MBTA Origin, Destination, Transfer (ODX)[11] tool. This tool showed that Central Square–Lynn Station, Wonderland Station, and stops at retail/commercial areas on the Lynnway are top origins and destinations. In addition, it was found that of all bus trips that begin in Lynn, 24 percent end somewhere on the rapid transit system. About half of these trips are destined for locations on the Blue Line and the other half use the Blue Line to access other destinations on the rapid transit system.[12] Figure 2-13 demonstrates the strong north-south connection served by Route 1A between Central Square–Lynn and Boston, Logan Airport, and Wonderland Station.

Figure 2-13 Top Origin Destination Pairs



Sources: Esri, HERE, Garmin, FAO, USGS, © OpenStreetMap contributors, and the GIS User Community

Traffic Congestion and Bus Service Delay

Peak hour travel time indexes compare peak hour travel times on a roadway to typical travel times. The Lynnway has a peak hour travel time index of 1.38 in the morning peak hour inbound, and 1.62 in the evening peak hour outbound, meaning travel time during the peak hours takes 38 to 62 percent longer than the typical travel time in the peak hours in the peak directions.[13] All commuters coming from points north of Wonderland Station must travel on Route 1A or other local roadways through Lynn and Revere to reach the station, contributing to the high travel time indexes.

Route 1A is also one of the corridors in Lynn with the highest total passenger delay, which is reflected in the travel time delay to account for the number of passengers using the bus to help identify where improvements could affect the largest number of people using the service. The Lynnway is delayed by approximately 460 passenger hours per day from 6 AM to 8 PM.[14]

Blue Line

The Blue Line rapid transit provides service between downtown Boston and Wonderland Station in Revere along Route 1A. While it does not service Lynn directly, many residents

11 The Origin, Destination, Transfer (ODX) Inference model looks at series of transactions for a CharlieCard or Ticket over the course of the day and infers each trip's origin, destination, and any transfers on an anonymous basis to understand travel patterns. The model only covers bus and rapid transit, it does not cover commuter rail, and has several other key limitations including scaling up for cash transactions. For this project, the analysis focuses on trips originating or destined for Lynn. More information on the ODX model can be found here: https://www.mbtabacktrack.com/blog/43-odx-model.

12 A very small percentage of trips use a bus (Routes 426, 434, and 450) to connect directly to the Orange or Green Line at Haymarket.

13 Note: Travel time index computed as the 50th percentile travel time/free flow travel time; values are for the hours/directions with the highest Travel Time Index. Data is between Central Square and Point

14 90th percentile daily passenger-hour delay – Massachusetts Department of Transportation, Lynn Transit Action Plan

access the Blue Line via car or bus to get to jobs located in Boston. Of the 1,500 daily transit riders heading to Boston, approximately 350 use one of several Lynn local bus routes to access Wonderland Station. In addition, approximately 325 of the 1,350 cars parked at Wonderland Station (24 percent) daily come from Lynn.[15] During the morning peak, approximately 30 percent of the light vehicles on Route 1A are destined for the Wonderland Station area,[16] meaning rapid transit access is a major contributor to roadway congestion and providing an improved connection further north could reduce this congestion. The Blue Line runs with peak frequencies of roughly five minutes and off-peak frequencies of 9-13 minutes and takes 20 minutes from Wonderland Station to downtown Boston.

Commuter Rail

Lynn is located along the overlapping section of the Newburyport and Rockport Commuter Rail lines (Figure 2-14), providing access to the Boston terminal in 20 – 25 minutes. The service also provides access to Gloucester (Rockport Line), Ipswich (Newburyport Line), Beverly, Salem, Chelsea, and other North Shore communities. Three commuter rail stations along the Newburyport/Rockport Line serve Lynn – two within the city itself and one in Swampscott, near neighborhoods in East Lynn. All three are proximate to the Route 1A corridor.

Figure 2-14 Map of Newburyport/Rockport Line

Service is focused on peak hour, peak direction travel, aimed at providing access to downtown Boston for traditional commuters. While some Newburyport/Rockport Line express trains bypass Lynn in the peak periods, a peak period train stops in Lynn approximately every 15-30 minutes. However, inbound trains often approach capacity in the morning, and schedule delays can result in full trains arriving at Lynn with no capacity for additional passengers. Across the system, midday and off-peak service is less frequent (every 30-60 minutes), making it more difficult to use for non-traditional work schedules.[17]

Lynn residents use the Central Square–Lynn and Swampscott stations. Another station, River Works, is open only to General Electric employees and visitors, but is planned to be redeveloped with connections to Route 1A and open to the general public. Commuter rail ridership, frequencies, and fares are summarized in Table 2-2.

15 Sample from License Plate Reader survey conducted in Fall 2019

16 MassDOT INRIX data, accessed March 2020.

17 MBTA Commuter Rail Newburyport/Rockport Line schedules are available at https://www.mbta.com/schedules/CR-Newburyport/timetable. Headways based on pre-COVID schedules.

Table 2-2 Commuter Rail Ridership, Frequencies, and Fares

Station	Typical Weekday Boardings	Typical Peak Period Frequencies	Typical Off Peak Frequencies	One-Way Fares to Boston
River Works	30	15-30 min. (by request)	Limited	$7.00
Lynn	550	15-30 min.	30-60 min.	$7.00
Swampscott	890	15-30 min.	30-60 min.	$8.00

The MBTA has identified the Newburyport/Rockport Line as an environmental justice line based on neighborhood demographics and has been investigating opportunities to bring more frequent and affordable commuter rail service to these communities.

Central Square–Lynn Station and Garage

Central Square–Lynn Station is located on a raised viaduct above ground, accessible by elevator and two sets of stairs. The MBTA is currently in the process of rehabilitating the station, with work expected to be completed in 2023.

A 978-space on-site parking garage at the station costs $2 daily and $35 monthly. Parking transaction data indicates that the parking garage is generally underutilized on both weekdays and weekends, with occupancy typically below 55 percent, leaving considerable capacity for additional users. This capacity provides a great endpoint for improved transit service to Boston, potentially removing single occupancy vehicles from the corridor.

Pedestrian and Bicycle Infrastructure

Sidewalks are available on both sides of the Lynnway (with the exception of no sidewalk on the north side for approximately 600 feet between Broad Street and Market Street) and on the east side of Market Street. The sidewalk condition along the Lynnway is inconsistent, ranging from good to poor. Sidewalk continuity is broken up by numerous curb cuts along the Lynnway and most driveway and intersecting street crosswalks are not ADA-compliant. Crosswalks are provided at most signalized intersections on the Lynnway, although no refuge is provided for crossing a total of 6-7 lanes of traffic. No more than one crosswalk is provided across the Lynnway, with one intersection not having any, contributing to the status of the Lynnway being a major barrier between the waterfront and the rest of Lynn. Unlike the Lynnway, the sidewalk along Market Street is in generally good condition. The intersection of Market Street at Broad Street next to Central Square–Lynn Station is the only intersection in the Project corridor that provides crosswalks across all four legs of the intersection.

Lynnway does not currently have existing bicycle infrastructure,but MassDOT is considering incorporating pedestrian and bicycle facilities into the General Edwards Bridge replacement project. In addition, the Community Path of Lynn Trail is an off-street trail running from Boston Street at the Saugus border to Summer Street (at Summer Street Place). The path is part of the Northern Strand Community Trail, which when complete will stretch from Everett to the Lynn Waterfront via Malden, Revere, and Saugus. The completed path will run along the east side of Market Street in the study area and along the north side of the Lynnway to the east of Market Street to the waterfront (see Figure 1-3).

3

Grant Funds, Sources, and Use of Project Funding

MassDOT is requesting $11,268,750 in RAISE discretionary grant funds for the environmental analysis, design, and construction of multimodal improvements along the Lynnway (Route 1A) in Lynn. This amount represents 75 percent of the total estimated Project costs of $15,025,000. The remaining 25 percent, $3,756,250, will be provided by funding from the Commonwealth of Massachusetts.

The total capital cost for the Project of $15,025,000 is based on planning estimates developed by MassDOT and MBTA for similar projects. The costs include construction costs as well as soft costs for planning and design.

Table 3-1 summarizes the funding sources for the Project.[18]

Table 3-1 Project Funding Sources

Source	Amount	Percent of Total Project Cost
Federal - RAISE Grant	$11,268,750	75%
State - MassDOT	$3,756,250	25%
Total	$15,025,000	100%

18 There are ongoing discussions between MassDOT and the MBTA about the potential for the MBTA to also participate at some level in the funding match associated with this application.

4

Merit Criteria

Primary Selection Criteria

Safety

The Lynnway is a known barrier for pedestrians and cyclists, particularly between downtown and the waterfront, and the redesign will provide safer crossings and movement along the roadway. The Project is expected to significantly increase safety along the corridor, in particular for non-motorists such as bicyclists and pedestrians. A total of 334 crashes were reported along the Project corridor in the MassDOT Crash Portal[19] for the most recent three-year crash period available, 2016-2018. The most common reported crash types were rear-end (118 crashes, or 35 percent) and angle (105 crashes, or 31 percent). Ten crashes were reported to include cyclists and 12 were reported to include pedestrians. The Project will address safety concerns in the roadways' redesign.

Pedestrian and bicycle safety will be increased through the inclusion of a shared use path along the Lynnway as well as shortened crossings with refuge islands. The shared use path will provide physical separation from traffic for cyclists and pedestrians to increase safety and encourage more people to use non-automobile modes of travel. With pedestrian refuge islands in the middle of the roadway, non-motorists will only have to cross 2-3 lanes of one-direction traffic instead of 6-7 lanes of bi-directional traffic. The shortened crossings not only reduce the physical distances pedestrians must cross, but also the time non-motorists are exposed to vehicular traffic. Crossing one direction of traffic at a time is also less stressful for pedestrians.

All pedestrian infrastructure will be ADA-compliant, including all bus stops. In addition to being physically safer, feedback sessions for the Better Bus Project showed that stop amenities such as the shelters and benches that will be provided as part of the Project can make the bus experience feel safer and more comfortable, making it a more attractive mobility choice.

Converting a travel lane to a bus-only lane is also expected to increase safety through signal retiming and reducing conflicts on the roadway. Center-running bus lanes eliminate bus conflicts with right-lane vehicles and bicycles. A before-and-after study in San Francisco found that converting general travel lanes into dedicated bus lanes painted onto downtown streets cut collisions by 16 percent and had 24 percent fewer crashes that resulted in injury,

19 Not including "parked" vehicles to account for crashes that occurred in parking lots.

compared to citywide rates.[20] Signal retiming can reduce rear-end crashes, especially if the change and clearance intervals are increased.[21] In addition, sideswipe crashes could be reduced when the number of lanes and the number of lane changes and weaving potential is reduced. Finally, the bus lanes with transit signal priority could be used by emergency vehicles and school buses to get through traffic, reducing delay in the trip.

Environmental Sustainability

The Project will create a more environmentally friendly and sustainable roadway through its design.

The shared use path will provide safe multimodal infrastructure, inviting an increased number of cyclists and pedestrians. The path will provide a critical link in the network for recreational and commuting purposes. In addition, it will provide another safe mode of transportation for no-car households.

The Project would serve to increase transit ridership resulting in a modal shift and reducing regional vehicle miles traveled (VMT), which can be an important contribution towards the Commonwealth's initiatives to address climate change. A recent study, based on an evaluation of INRIX traffic data, estimates a 4 percent shift of peak-period traffic to the buses. Traffic volumes on the Lynnway are anticipated to be reduced, decreasing associated automobile emissions in the corridor. Bus lanes and transit signal priority will reduce travel time delays and improve reliability for buses, allowing the same number of buses to transport more people as more bus trips could be completed in the same time, improving bus efficiency. There is capacity on the existing routes meaning no additional vehicles would be necessary to accommodate the additional riders. Buses can also carry more passengers lowering the person-miles per gallon (PMPG). Because buses can transport a greater number of passengers than a car, they are more fuel efficient even though the average fleet bus operates with a lower MPG rating than the average car.

The landscape along the Project corridor is urban with limited pervious surfaces. The roadway cross section is primarily abutted by paved parking areas and impervious surfaces. The Project uses an existing roadway, converting a general purpose lane to a dedicated bus lane, and the shared use path will be primarily built over currently impervious surfaces with varied drainage capability; therefore, stormwater impacts will be negligible as there is minimal increase in impervious surface. Best management practices (BMPs) for collection, storage, and treatment of stormwater will be a priority as MassDOT and DCR recognize the critical role of stormwater management in successful transportation projects.

The Project will be designed in alignment with DCR's desire to emphasize the Lynnway as a parkway that promotes and invites active transportation and incorporates more street trees and greenspace, while preserving vehicular connectivity. The current design represents a significant increase in the amount of greenspace and street trees and MassDOT will continue to work with DCR to identify additional opportunities to decrease impervious surfaces.

Multimodal investments complement the transit-oriented development in surrounding areas. Improvements in the Route 1A corridor are anticipated to stimulate private redevelopment

20 Laura Bliss, To Build a Better Bus Lane, Just Paint It, https://www.bloomberg.com/, March 1, 2019.

21 Crash Modification Factors Clearinghouse, http://www.cmfclearinghouse.org/

of the existing underutilized industrial and brownfield sites along the corridor. This type of development provides increased opportunity for car-free households that utilize transit, pedestrian, and bicycle access for their mobility needs. The *Lynn Revised Waterfront Master Plan* (September 2019) identifies the concerns of sea level rise on the area and focuses the conversion of the land between the Lynnway and the ocean into more sustainable, environmentally-friendly, and **resilient** uses. And an improved multimodal Lynnway is essential to that resiliency.

Separate from this Project, the MBTA is also investigating the potential to introduce more environmentally-friendly vehicles, such as battery-electric buses, to the fleet which would further enhance the gains from mode shift. As the MBTA pursues low- and zero-emission fleets for the future, the presence of a dedicated busway in this community will provide an opportunity to serve as a corridor for implementing emerging vehicle technologies.

Quality of Life

The City of Lynn is home to a number of immigrant communities: approximately one third of the population was born outside the United States and around 50 percent of the households speak a language other than English at home. In addition, Lynn's residents face financial burdens at a greater rate than other cities in the region: approximately 20 percent of households live below the poverty line and the average household income is just over $50,000.

The highest population density in Lynn is located near the Project's northern terminus, so the Project has the potential to benefit many residents. In addition to being a dense residential area, downtown Lynn includes minority, English-isolated, and low-income environmental justice populations as well as Areas of Persistent Poverty which will be served by the Project. The downtown area of Lynn has a high rate of zero-car households which will benefit from the additional safe transportation choices provided by this Project. Improving access to opportunities across the Boston region through a stronger transit network is a vital part of supporting the City's lower income and immigrant communities.

Route 1A is one of the primary connections to Boston for North Shore residents and a key commuting route. Outside of Lynn, Boston is the largest trip destination by municipality, accounting for over 12,000 trips per day on weekdays and over 8,000 trips per day on weekends. Of all commutes to work or school that start in Lynn, 4,000 trips per weekday are destined for Boston. A popular destination along Route 1A for commuters is the northern terminus of the Blue Line, Wonderland Station, which is located along Route 1A approximately 2.8 miles south of the Project in Revere. The Lynnway is also a commercial destination, as it is lined with many businesses. Based on an analysis for the Lynn Transit Action Plan (LTAP) using the MBTA Origin, Destination, Transfer (ODX) tool, the bus stop at Hanson Street/Lynnway serving a shopping plaza is one of the more popular destination trips originating in Lynn. The Project's shared use path would eventually allow a separated bike connection between the proposed housing to Wonderland Station. In addition, the path will provide work, shopping, and recreational connections by connecting to the Northern Strand Community Trail, which when complete will stretch from Everett to the Lynn Waterfront via Malden, Revere, and Saugus providing direct access to Nahant Beach and adjacent shopping plazas. Within Lynn, the Northern Strand Community Trail is

planned to extend through downtown Lynn along South Common Street, Market Street, and the Lynnway east of Market Street, ending at a DCR park along the waterfront.

A public input survey conducted for the LTAP found that low-income households use MBTA bus services more often than higher-income households. The bus service has remained the most affordable option for transit in the area and has proven to be the most resilient through the Covid-19 pandemic. Local fares are $1.70, with passengers transferring to the Blue Line paying the subway fare of $2.40. Express buses to Boston cost $4.25. While conveniently located, the commuter rail cost of $7.00 one-way is significantly more expensive than the bus and/or rapid transit service and may be unaffordable for low-income households.

According to the survey, approximately one-third of frequent MBTA riders use the bus routes along the Project corridor, MBTA Bus Routes 439, 441, or 442. In addition, approximately 50 percent of frequent MBTA riders reported using rapid transit, which includes the Blue Line. The Project will dramatically reduce delay for the aforementioned buses, which provide service to Wonderland Station and the Blue Line and other rapid transit services closer to Boston. In addition, the shared use path will provide a critical link in the bicycle and pedestrian networks to access the buses and Blue Line via cycling or walking.

As noted previously, the MBTA only considers three of the fifteen stops along the Lynnway accessible and meeting ADA criteria. Bus stops will be improved to address ADA accessibility and include amenities such as shelters, benches, and real-time electronic information boards. Further, even the stops that are considered accessible are not convenient to get to in many cases, with uneven or narrow sidewalks at or approaching the stops. In addition to being physically safer, the bus stop amenities will make bus service a more attractive mobility choice, as feedback sessions for the Better Bus Project showed that stop amenities make the bus service feel safer and more comfortable for users.

The MBTA investigated the potential of a Blue Line extension to Lynn or further north, but found numerous challenges, particularly related to wetlands impacts. As an alternative public transit option, the MBTA and City of Lynn piloted ferry service from Lynn to Boston in 2014, 2015, and 2017, but the cost was equivalent to the commuter rail at $14.00 round trip.

Economic Competitiveness

A high concentration of jobs in Lynn is located along the Lynnway, which is Lynn's biggest commercial and industrial area. The shared use path and improved pedestrian crossings will greatly improve active transportation access to the area, inviting additional consumers and providing options for access to jobs and recreation. The bus lanes and transit signal priority will reduce travel time delays for buses and allow the same number of buses to transport more people as more bus trips could be completed in the same time, improving transit access to the corridor and Central Square-Lynn Station. As previously mentioned, a survey conducted for the LTAP found that low-income households use MBTA bus services, the most affordable public transportation offered, more often than higher-income households. Also, the Project will provide a better link to Wonderland Station, the northern terminus of the Blue Line rapid transit which provides service to the airport and other parts of Boston.

According to numerous recent planning documents, the City of Lynn anticipates significant growth and development in the near future. Historically an industrial and coastal hub, Lynn has plans to transform large industrial areas along the Lynn Harbor and Saugus River into residential and mixed-use developments. A full build-out could establish over 4,000 new residential units, over 1.5 million square feet of retail and commercial uses, and a new green space along the Lynn Harbor to create a vibrant new connection to the waterfront. The Project corridor is considered the primary transportation link for the area and it will provide safer multimodal connections for the residents and workers of this new development. More reliable and efficient bus service as well as a safe pedestrian and bicycle route to downtown will be provided. The Lynnway will no longer be a barrier for non-motorists, as the crossings will be significantly shortened, and all will be ADA-compliant.

The Project corridor also serves the community of Revere to the south and Route 1A becomes North Shore Road in Revere. The City of Revere is anticipating similar growth along the Route 1A corridor and there has been recent discussion of a zoning change that would promote more mixed-use and transit-oriented development in the area. Finally, it should be noted that Route 1A is an important corridor not just for Lynn and Revere residents but also for many other communities along the North Shore, including Marblehead and Peabody. The Project will benefit workers and residents all along the North Shore and Boston by providing more reliable bus service to key destinations.

State of Good Repair

The geography of the North Shore is such that Route 1A (North Shore Road/Lynnway) provides the primary access route linking these communities with the employment and essential services to the south in Boston. For Lynn and Revere to remain competitive, the existing infrastructure of Route 1A must be utilized to the maximum extent possible to efficiently move people. Leveraging the use of the existing roadway infrastructure and existing General Edwards Bridge for increased transit use is the most sustainable approach to increasing the through-put of persons on Route 1A. The investment in this Project will improve the existing roadway infrastructure, bus stops, and traffic signals along the corridor. The Project will maximize the existing investment in bus equipment as the MBTA will be able to provide more service using the existing bus fleet due to the improved travel times on the bus routes. The result will be a project that creates a significant service improvement by investing in existing infrastructure without a notable increase to maintenance costs or negative impacts to the environment.

MassDOT, DCR, and the MBTA have identified the Lynnway as needing upgrades to accommodate all modes and users. If this critical infrastructure is left unimproved, these communities will continue to experience the negative consequences of congestion and degraded safety, potentially threatening their economic competitiveness.

Secondary Selection Criteria

Partnership

In early 2019, the MBTA *Focus40* Plan identified Lynn as a "priority place" for potential improvements to public transportation – a place that would benefit from and can support higher quality transit service. MassDOT and the MBTA developed the Lynn Transit Action

Plan (LTAP) to identify the specific strategies to address this challenge and make public transit a better mobility choice for residents. The proposed center-running bus lanes from Central Square–Lynn Station to Wonderland Station were the recommendation of the LTAP, which included a comprehensive outreach program.

Public outreach efforts focused on being inclusive and interactive – providing opportunities throughout the process to engage with the project and multiple platforms for providing input. Since approximately 50 percent of the population in Lynn speaks a language other than English at home, the outreach often included materials in multiple languages. The approach to stakeholder outreach included a public input survey, two open houses, project briefings for area stakeholders, digital communication through a project website and email list, and coordination with other agencies. MassDOT also convened a study Advisory Committee that represented a variety of interests in the City of Lynn, including city and state offices, and community groups for residents and businesses. The study team met with the Advisory Committee throughout the project and collaborated on the process that led to the development of the project recommendations. In addition to providing guidance at meetings, the Advisory Committee members actively shared project news and information with their constituents. This outreach from the Advisory Committee included circulating the public input survey and providing notifications about events (such as the project open house), which enabled MassDOT to solicit feedback from a broad group of transit users and non-users.

The public input survey provided guidance on respondents' public transit improvement priorities. A total of 1,081 responses were collected over the almost two-month period in which the survey was open (September 16 to November 11, 2019). The survey was made available in six languages most relevant in Lynn: Ayisyen (Haitian Creole), English, Khmer, Portuguese, Russian and Spanish. English accounted for over 90 percent of all responses. Respondents were also given the option of answering demographic questions. Of these, 841 individuals provided information on their ethnicity, with 26 percent identifying as Latino or Hispanic. 807 individuals provided information on their race, with 8 percent identifying as Black or African American, 3 percent as Asian, and 53 percent as White.

Survey results demonstrated the need for better transit in the City, and differences in transit use between residents 66 percent of respondents from low-income households reported using MBTA bus services in a typical week, as compared to only 41 percent of respondents from high-income households (annual household income >$44,500). In addition, 29 percent of frequent riders reported travelling on a Route 441/442 (Marblehead – Wonderland Station) bus in a typical week, which travel along Route 1A, and improved reliability was among the top three priorities for both frequent and non-frequent riders.

The Project would directly address many of these survey results by improving bus service and stop amenities along Route 1A with the center-running bus lanes, which would increase reliability for the most popular bus services in Lynn. The Project would also serve downtown, which has the highest concentration of low-income households in Lynn, and directly addresses many of the community's concerns and needs.

Innovation: Technology, Delivery, Financing

By providing a dedicated busway in this corridor, the Project sponsors are readying these communities to be on the cutting-edge of potential pilot programs for innovative

technologies. One of the first center-running bus lane projects in New England is under construction on Columbus Avenue in Boston, so this Project would be among the first to provide this innovative, high-quality transit solution in the area. In addition, the dedicated busway will be an excellent candidate for potential future projects using autonomous and connected vehicles with zero emission technology, providing a restricted corridor that can separate transit vehicles from general traffic.

The traditional Design-Bid-Build (DBB) project delivery method is where the design and construction phases of a project proceed sequentially. The Owner designs, or hires a designer to furnish complete design services, and then advertises and awards a separate construction contract based on the designer's completed construction documents. In DBB, the agency "owns" the details of design during construction and as a result, is responsible for the costs of any errors or omissions encountered in construction.

MassDOT and the MBTA may consider an alternative delivery method in the development of this Project. Three other delivery methods are a possibility for this Project, Design-Build (DB), Construction Manager/General Contractor (CM/GC) and Public-Private Partnership (P3).

Design-Build is a project delivery method in which the Owner procures both design and construction services in the same contract from a single, legal unit referred to as the Design-Build Entity. The method uses a "Best Value" selection process rather than the standard DBB low bid procedures. The Design-Build Entity with the best value proposal is awarded the contract and the Design-Build Entity controls the details of design and is responsible for the costs of errors or omissions encountered in construction resulting from the final design developed by the Design-Build Entity.

CM/GC is a project delivery method in which the Owner contracts separately with a designer and a construction manager. This delivery method provides for contractor input early in the design process through the employment of a Program Manager (PM)/CM, with the goal of optimizing constructability, schedule and cost control during final design and construction. A CM/GC contractor is procured through a qualifications and fee-based selection process, similar to the "Best Value" selection process used in DB.

P3s involve a contractual arrangement between a private sector company and a public government agency that can be used to finance, build, operate and maintain public projects. Through this agreement, the skills and assets of each sector (private and public) are shared in delivering a service or facility for the use of the general public. The private partner participates in designing, completing, implementing, and funding the project while the public partner focuses on defining and monitoring compliance with the project objectives. Risks are distributed between the public and private partners according to the ability of each to access, control, and manage them. Instead of working for a governmental agency, the contractor that will perform the construction will now work for the private sector partner, providing much more flexibility than the governmental agency might have. This allows the private entity to select a project delivery system that fits its individual needs.

5

Project Readiness

Technical Readiness

The study phase of the Project included a comprehensive stakeholder and public outreach initiative. The Support Letters included in Appendix B demonstrate the level of coordination and approval from all key stakeholders of this Project. Engineering and Environmental Documentation will be conducted as part of the Project.

As noted earlier, several studies have previously looked at improving the city's transportation connections and access to and from Boston. MassDOT conducted a North Shore Transit Improvements Alternatives Analysis/Draft Environmental Impact Statement in 2011, which evaluated a potential Blue Line extension to Lynn and a shuttle service between Wonderland Station and Lynn.[22] A corridor study of Route 1A recommended improvements for better transit access.[23] In early 2019, the MBTA *Focus40* Plan identified Lynn as a priority place to target improvements to public transportation. As a result, the Lynn Transit Action Plan identified and recommended potential improvements for transit services in Lynn, one of which was a center-running bus lane between Central Square–Lynn Station and Wonderland Station. Additionally, the Better Bus Project—with a first set of changes rolled out on September 1, 2019—is looking at ways to improve the MBTA bus network.

The Project's Timeline is demonstrated in Table 5-1.

Table 5-1 Project Timeline

Task	2021	2022	2023	2024
Preliminary Engineering	♦ ♦	♦		
NEPA/MEPA Review		♦ ♦ ♦		
Permits & Approvals		♦ ♦	♦	
Final Engineering		♦ ♦	♦ ♦	
Construction			♦ ♦	♦ ♦ ♦

22 MassDOT, "North Shore Transit Improvements: Alternatives Analysis/Draft Environmental Impact Statement," December 2011.

23 Central Transportation Planning Staff of the Boston Region Metropolitan Planning Organization, "Route 1A/Lynnway/Carroll Parkway Study in Lynn," June 2016.

Environmental Readiness

MassDOT and the MBTA have worked closely with the Federal and State resource agencies on regulatory permitting and environmental approvals on an extensive list of capital projects in the region. This experience positions this Project to move seamlessly through the environmental process. Adding a center-running bus lane and other public roadway amenities in this location likely requires issuance of an Environmental Notification Form (ENF) under the Massachusetts Environmental Policy Act (MEPA) for use of state funding, and meeting or exceeding one or more of the following review thresholds:

- Potential for greater than ½-acre Land Subject to Coastal Flowage (LSCSF)/100-year floodplain
- Potential widening roadway by 4 or more feet for ½ or more miles
- Potential to cut 5 or more living public shade trees of 14+ inches in diameter

This analysis assumes no Article 97 impacts to Carroll Parkway or other protected public open space adjacent to the existing roadway right-of-way.

Project review under the National Environmental Policy Act (NEPA) is required for use of federal funding. FHWA consultation is required to confirm if the Project qualifies as a Categorical Exclusion (CE) under "Special Consideration" as a Multimodal Project under FHWA's 23 C.F.R. 771.117 and FTA's 23 C.F.R. 771.118 CEs,[24] or if an Environmental Assessment (EA) is required. This determination should occur through coordination with MassDOT and FHWA (and any other state and federal partners) as the Project advances, existing conditions are characterized, and more detailed design becomes available to better define Project impacts.

Concurrent with the NEPA process, the Project will also require review under special purpose laws, including Section 106 of the National Historic Preservation Act for review of cultural resources, Section 7 of the Endangered Species Act for Northern Long-eared bat, Red Knot and Roseate Tern bird species, and possibly Section 4(f) of the U.S. DOT Act of 1966 if any impacts to protected open space arise.

Permitting

Table 5-2 provides a list of potential federal, state, and local environmental notifications, permits, and approvals required to advance Project construction. This list should be reviewed and updated as the Project advances.

24 Multimodal projects containing both FHWA-funded and FTA-funded elements (such as the reconstruction of a highway lane within existing right-of-way for express bus service) may be processed as CEs under 23 C.F.R. 771.117 for FHWA and under section 23C F.R. 771.118 for FTA, as appropriate.

Table 5-2 Potential Permits, Approvals or Notifications

Agency	Permit, Approval or Notification
Leading Federal Agency (FHWA or FTA)	NEPA Categorical Exclusion (CE) or Environmental Assessment (EA) (dependent on alignment and impacts).
Massachusetts Historical Commission (MHC)	Section 106 Standard Review
Massachusetts Office of Coastal Zone Management (CZM)	Federal Consistency Certification
U.S. Fish and Wildlife Service (USFWS)	Section 7 Consultation (as required)
U.S. Environmental Protection Agency (U.S. EPA)	National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges from Construction Sites (CGP)
Massachusetts Department of Environmental Protection (MassDEP)	› Chapter 91 Waterways License (if required) › Massachusetts Contingency Plan Review/Preliminary Determination
Massachusetts Executive Office of Energy and Environmental Affairs (EEA)	Massachusetts Environmental Policy Act (MEPA) Review/ Environmental Notification Form Certificate
Local Conservation Commission	Notice of Intent/Order of Conditions (Massachusetts Wetlands Protection Act)

Financial Capacity

Budget details for the Project are described in the following section. The budget indicates the sources of funding, including the $11,268,750 RAISE grant funds being requested. The funding plan assumes that funds for the Project will be obligated by September 30, 2024.

The financing structure for the Project is straightforward: this Project will be financed by a combination of state and federal funding sources. The requested RAISE grant is 75 percent of the necessary funds to complete the Project, while state funds will provide the remaining 25 percent.

MassDOT is committed to providing the $3,756,250 non-RAISE-grant funds towards the $15,025,000 total needed to fund the Project. MassDOT and MBTA have extensive experience managing the design and construction of projects of this scope and budget. Risk in funding for the Project is minimized by the simplified approach to funding this critical mobility improvement directly from two discrete funding sources, the RAISE grant and state funding. The funding is scheduled to be expended over an estimated two-year construction period beginning in 2022, with 25 percent anticipated to be expended the first year and 75 percent the second year. Table 5-2 summarizes the anticipated funding schedule for the Project.

Table 5-2 Funding Schedule

Source	2022 (25%)	2023 (75%)	Total (100%)
Federal - RAISE Grant	$2,817,188	$8,451,562	$11,268,750
State - MassDOT	$939,062	$2,817,188	$3,756,250
Total	$3,756,250	$11,268,750	$15,025,000

6

Benefit-Cost Analysis

The Project will provide travel time, vehicle operating cost, safety, and health benefits that will exceed the Project costs, with an estimated benefit/cost ratio of 1.23.

Travel time benefits will be realized for existing bus riders. It is estimated that daily savings are approximately 360 passenger hours per day and 90,000 passenger hours annually. Vehicle operating costs will be realized for those who shift from driving to the quicker, more reliable bus service. A recent study, based on an evaluation of INRIX traffic data, estimates a 4 percent shift of peak-period traffic to the buses. Safety benefits include a reduction in crashes involving pedestrians or bicyclists. The shared use path will provide increased separation and safety for bicyclists and pedestrians. With pedestrian refuge islands as part of the center-lane bus design, non-motorists will only have to cross 2-3 lanes of one-direction traffic instead of 6-7 lanes of bi-directional traffic. Health benefits will be realized by improvements to active transportation facilities, including new bicyclists using the shared use path, which will be a key connection of a large regional bicycle network. Table 6-1 summarizes the analysis. Details of the methodology, and other supporting documentation, are provided in the appendix.

Table 6-1 Discounted Project Costs and Benefits

Description	Value (Discounted 2019 $)
Travel Time Savings	$12,240,782
Vehicle Operating Cost	$391,759
Safety	$1,431,253
Health	$3,244,111
O&M Costs	($2,980,854)
Total Discounted Project Benefits	**$14,327,052**
Total Discounted Project Costs	**$11,663,094**
Net Present Value	**$2,663,958**
Benefit Cost Ratio	**1.23**